APPENDIX J

Potential Dose From Consumption of Beef

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This appendix includes the equations used to estimate the concentrations of metals in edible beef tissue and the potential dose from ingestion of beef.

Conservative Estimation of Metal Concentrations in Edible Beef Tissue

All equations and values were collected from CEPA 1996, U.S. EPA 1990c, and U.S. EPA 1998c, or assumed as noted.

$$C_{beef} = [(F_f * Q_{pi} * P_i) + (Q_s * C_s * B_s)] * Ba_{beef} * MF$$

Where:

C_{beef} = concentration in edible beef tissue

F_f = fraction of plants grown on contaminated soil and ingested, assume 100% or 1

Q_{pi} = quantity of forage eaten by cattle per day, 8.8 kg DW/d

P_i = COPC concentration in forage eaten by cattle, see below for calculation

Q_s = quantity of soil eaten by animal per day, 0.5 kg/day

C_s = average soil concentration over the exposure duration, assume 2 mg arsenic/kg soil or 1 mg antimony or cadmium/kg soil

B_s = soil bioavailability (unitless), assume 100% or 1

Ba_{beef} = COPC biotransfer factor for beef, 0.001, 0.002, and 0.00055 day/kg FW tissue for Sb, As, and Cd, respectively.

MF = metabolism factor, 1 is recommended for all metals

$$P_i = C_s * Br_{forage}$$

Where:

Br_{forage} = ratio of the concentration in forage tissue to the concentration in soil, 0.2, 0.036, and 0.364 (mg/kg DW plant)/(mg/kg soil) for antimony, arsenic, and cadmium, respectivley.

$$\text{Dose from beef ingestion} = (IR_{beef} * C_{beef})/BW$$

Where:

IR_{beef} = adult ingestion rate of beef, for purposes of this conservative estimate, the consumption rate of all meat was used and we assumed that all meat ingested was contaminated beef, 0.250 kg meat per day (maximum meat ingestion rate, adult males over 20).

BW = adult body weight, assumed 70 kg